

Determining the nature, size and age of the Universe

Appendix A: The Rule of 57

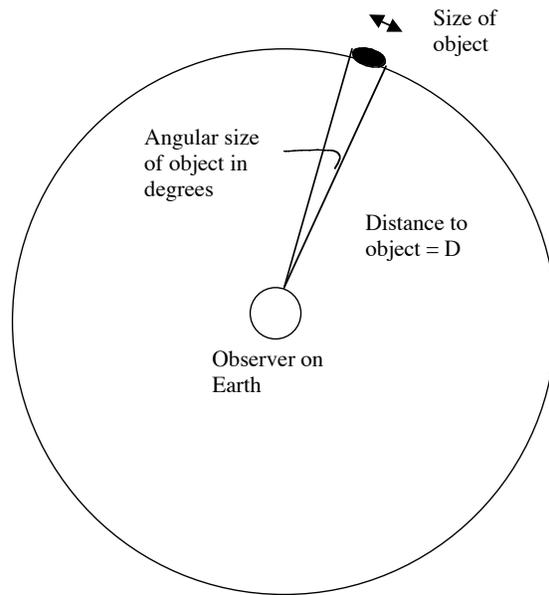
The key to using telescope images to measure distances is to realize that an object's apparent angular size is directly related to its actual size and distance from you. The farther away an object is, the smaller it appears. An object twice as far appears half as big. (This relationship holds true for objects that take up less than 1° in your field of view, but fortunately that's true of almost all astronomical objects.)

A handy fact for calculating the actual size or distance of a far away object when you can only measure its angular size: an object with an angular size of 1° is about 57 times farther away than it is big.

The ratio of the angular size of an object (in degrees) to a whole 360° circle should equal the ratio of the actual size of the object to the circumference of a circle at that distance from the observer.

Expressed as an equation:

$$\frac{\text{Angular size}}{360^\circ} = \frac{\text{Actual size}}{2\pi D}$$



This equation can be re-written as:

$$\frac{\text{Distance of object}}{\text{Size of object}} = \frac{360^\circ}{2(3.14)(\text{Angular size in degrees})}$$

$$\frac{\text{Distance of object}}{\text{Size of object}} = \frac{57}{\text{Angular size}}$$

This material was adapted directly from the Beyond the Solar System curriculum developed by the Harvard-Smithsonian Center for Astrophysics. More information about Beyond the Solar System can be found on the web: <http://www.cfa.harvard.edu/seuforum/btss/dvd/>